

**Rule 233 Organic Solvent Degreasing Operations**  
(Amended 1/23/96; Recodified 12/17/19)

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**RULE 233**

- 1 **PURPOSE:** To control volatile organic compound (VOC) emissions from solvent cleaning and degreasing operations.
- 2 **APPLICABILITY:** This Rule shall apply to all VOC solvent cleaning and degreasing operations.
- 3 **EXEMPTIONS**
  - 3.1 Solvent cleaning and degreasing operations which use less than 110 gallons of solvent per year are exempt from the requirements of this Rule provided that all solvent, including waste solvent and waste solvent residue, is stored in closed containers at all times and that the containers have a label indicating the name of the solvent/material they contain.
  - 3.2 Solvent cleaning operations using solvent (including emulsions) containing no more than 2% of VOC (wt) as determined by the United States Environmental Protection Agency (EPA) Method 24 shall not be subject to the requirements of this Rule.
  - 3.3 Cold solvent cleaners having reservoir capacities of 5.0 gallons or less or which have an evaporative area of less than 1.0ft<sup>2</sup> (0.09M<sup>2</sup>) are exempt from the equipment requirements in Section 5 of this Rule.
  - 3.4 The provisions of this Rule do not apply to wipe cleaning.
- 4 **DEFINITIONS**
  - 4.1 **Air Pollution Control Officer:** The Air Pollution Control Officer (APCO), or his or her designee, of an air quality management district or an air pollution control district.
  - 4.2 **Air-Vapor Interface:** The top of the solvent-vapor layer, and the air touching this layer.
  - 4.1 **Batch-Loaded:** Material placed in a non-conveyorized container for cleaning.
  - 4.2 **Cold Cleaner:** Any cleaner using solvent which, if heated, is maintained below the initial boiling point temperature. The cleaners include, but are not limited to, remote reservoirs, spray sinks and batch-loaded dip tanks.
  - 4.3 **Condenser (Or Primary Condenser):** A device, such as cooling coils, used to condense (liquefy) solvent vapor.

- 4.4 Condenser Flow Switch:** A safety switch connected to a thermostat which shuts off the sump heater if the condenser coolant is either not circulating or exceeds its designed operating temperature.
- 4.5 Control Device:** A device for reducing emissions of VOC to the atmosphere.
- 4.6 ConveyORIZED Solvent Cleaner:** Any conveyORIZED cold or vapor solvent cleaner, including but not limited to gyro, vibra, monorail, cross-rod, mesh, belt and strip cleaner. Strip cleaners clean material by drawing the strip itself through the unit for cleaning prior to coating or other fabrication processes.
- 4.7 Emulsion:** A suspension of small droplets of one liquid in a second liquid.
- 4.8 Evaporation:** To change into a vapor, normally from a liquid state.
- 4.9 Evaporative Surface Area**
- 4.9.1 Cold Cleaner**
- 4.9.1.1** The surface area of the top of the solvent
- 4.9.1.2** The surface area of the solvent sink or work area for a remote reservoir.
- 4.9.2 Vapor Solvent Cleaner:** The surface area of the top of the solvent vapor-air interface.
- 4.9.3 ConveyORIZED Solvent Cleaner**
- 4.9.3.1 Cold Cleaner:** The surface area of the top of the solvent.
- 4.9.3.2 Vapor Solvent Cleaner:** The surface area of the top of the solvent vapor-air interface.
- 4.10 Freeboard Height**
- 4.10.1 Cold Cleaner:** The vertical distance from the top of the solvent, or the solvent drain of a remote reservoir cold cleaner, to the top of the cold cleaner.
- 4.10.2 Batch-Loaded Vapor Solvent Cleaner:** The vertical distance from the top of the solvent vapor-air interface to the top of the solvent cleaner.
- 4.10.3 ConveyORIZED Solvent Cleaner**
- 4.10.3.1** For non-boiling solvent, the vertical distance from the top of the solvent to the bottom of the lowest opening in the solvent cleaner where vapors can escape.
- 4.10.3.2** For boiling solvent, the vertical distance from the top of the solvent vapor-air interface to the bottom of the lowest opening in the solvent cleaner where vapors can escape.
- 4.11 Freeboard Ratio:** The freeboard height divided by the smaller of the inside

length or the inside width of the solvent cleaner evaporative area.

- 4.12 Initial Boiling Point:** The boiling point of a solvent as defined by American Society for Testing and Materials (ASTM) Method D-1078-86.
- 4.13 Leak:** 3 or more drops of liquid solvent per minute.
- 4.14 Lip Exhaust:** A system which collects solvent vapors escaping from the top of a cleaner and directs them away from personnel using the cleaner.
- 4.15 Low Volatility Solvent:** A solvent with an initial boiling point which is greater than 120°C (248°F) and with a temperature as used, at least 100°C (180°F) below the initial boiling point.
- 4.16 Make-Up Solvent:** That solvent added to the solvent cleaning operation to replace solvent lost through evaporation or other means.
- 4.17 Refrigerated Freeboard Chiller:** A secondary cooling coil mounted above the primary condenser which provides a chilled air blanket above the solvent vapor air-interface to cause the condensation of additional solvent vapor.
- 4.18 Remote Reservoir:** A cold cleaner with a tank which is completely enclosed except for a solvent return opening no larger than 100 square centimeters which allows used solvent to drain into it from a separate solvent sink or work area and which is not accessible for soaking workloads.
- 4.19 Solvent:** Compounds which are used as diluents, thinners, dissolvers, viscosity reducers, cleaning agents or for other similar uses.
- 4.20 Spray Safety Switch:** A manually reset switch which shuts off the spray pump if the vapor level drops more than 10 centimeters (4 inches).
- 4.21 Ultrasonics:** Enhancement of the cleaning process by agitation of liquid solvents with high frequency sound wave vibrations.
- 4.22 Vapor Level Control Thermostat:** A manually reset safety switch which turns off the sump heater if the thermostat senses the temperature rising above the designed operating level at the air-vapor interface.
- 4.23 Vapor Solvent Cleaner:** Any solvent cleaner that cleans through the condensation of hot solvent vapor on colder workloads.
- 4.24 Volatile Organic Compound (VOC):** Any compound as defined in Rule 101 *Definitions* of these Rules and Regulations.
- 4.25 Volatile Solvent:** Any solvent that is not a low volatility solvent.

- 4.26 Waste Solvent Residue:** Material which may contain dirt, oil, metal particles, and/or other waste products concentrated after heat distillation of the waste solvent either in the solvent cleaner itself or after distillation in a separate still.
- 4.27 Wipe Cleaning:** That method of cleaning which utilizes a material such as a rag wetted with a solvent, coupled with a physical rubbing process to remove contaminants from surfaces.
- 4.28 Workload:** The objects put in a cleaner for the purpose of removing oil, grease, soil, coating, dirt or other undesirable matter from the surface of the objects.
- 4.29 Workload Area:**
- 4.29.1** The plane geometric surface area of the top of the submerged parts basket, or
  - 4.29.2** The combined plane geometric surface area(s) displaced by the submerged workload, if no basket is used.

## **5 EQUIPMENT REQUIREMENTS**

- 5.1** All cleaners shall be equipped with the following
- 5.1.1** An apparatus or cover(s) which reduces solvent evaporation, except as provided in Section 5.2 below.
  - 5.1.2** A permanent, conspicuous label summarizing the applicable operating requirements contained in Section 7 of this Rule.
  - 5.1.3** A device for draining cleaned parts which permits the drained solvent or drag-out to be returned to the cleaner solvent tank.
- 5.2** Remote reservoir cold cleaners shall be equipped with all of the following:
- 5.2.1** A sink or work area which is sloped sufficiently towards the drain to prevent pooling of solvent.
  - 5.2.2** A single drain hole, not larger than 100 square centimeters (15.5 square inches) in area, for the solvent to flow from the sink into the enclosed reservoir.
  - 5.2.3** Except for cleaners using low volatility solvents, a drain plug or a cover for placement over the top of the sink when the equipment is not in use.
  - 5.2.4** A freeboard height not less than 6 inches.
- 5.3 Cold Cleaners**
- 5.3.1 Freeboard Requirements:**
    - 5.3.1.1** Cold cleaners using only low volatility solvents which are not agitated, shall operate with a freeboard height not less than 6 inches.



- 5.6.2 Minimized entrance and exit openings which silhouette the work loads such that the average clearance between material and the edges of the cleaner openings is less than 10 centimeters (4 inches) or less than 10% of the opening width
- 5.6.3 A primary condenser
- 5.6.4 A vapor level control thermostat
- 5.6.5 A condenser flow switch
- 5.6.6 A spray safety switch
- 5.6.7 A freeboard ratio greater than or equal to 0.75 which is physically verifiable, or a refrigerated freeboard chiller for which the chilled air blanket temperature (F) at the coldest point on the vertical axis in the center of the air-vapor interface shall be no greater than 30% of the initial boiling point (F) of the solvent used or no greater than 40°F. If the chiller operates below the freezing temperature of water, it shall be equipped with an automatic defrost.

- 6 ALTERNATIVE CONTROL REQUIREMENTS:** Alternatively, a system to collect emissions which are vented to a control device may be used to satisfy the requirements of Sections 5.3.1, 5.4.5, 5.4.7, 5.5.3, and 5.6.7 of this Rule, provided that the overall efficiency (the collection efficiency multiplied by the control efficiency) of the total system shall not be less than 85% by weight in reducing total non-methane hydrocarbons as determined by EPA Method 25. The collection system shall have a ventilation rate not greater than 20 cubic meters per minute per square meter over the total area of the solvent cleaner openings unless the rate must be changed to meet federal and State occupational safety and health administration requirements. The system must be approved in writing by the APCO.

## **7 OPERATING REQUIREMENTS**

### **7.1 All Cleaners**

- 7.1.1 The solvent cleaning equipment and emission control device shall be operated and maintained in proper working order.
- 7.1.2 Cleaners shall not be operated when leaking.
- 7.1.3 All solvent, including waste solvent and waste solvent residues, shall be stored in closed containers at all times. The containers shall have a label indicating the name of the solvent/material they contain.
- 7.1.4 Waste solvent and residues shall be disposed of by one of the following methods:
  - 7.1.4.1 A commercial waste solvent reclamation service licensed by the State of California
  - 7.1.4.2 At a facility that is federally or State licensed to treat, store or dispose of such waste
  - 7.1.4.3 Recycling in conformance with Section 25143.2 of the California Health and Safety Code.
- 7.1.5 Solvent cleaners, except remote reservoir cold cleaners using low

volatility solvent, shall be covered except to process work or to perform maintenance.

- 7.1.6** Solvent carry-out shall be minimized by the following methods:
  - 7.1.6.1** Rack workload for drainage
  - 7.1.6.2** Limit the vertical speed of a powered hoist, if one is used, to not more than 3.3 meters per minute (11 ft/min)
  - 7.1.6.3** Retain the workload below the air-vapor interface until condensation ceases, as applicable
  - 7.1.6.4** For manual operation, from the solvent cleaner until visually dry and all dripping ceases. This requirement does not apply to emulsion cleaner workload that is rinsed with water within the cleaner immediately after cleaning.
- 7.1.7** The cleaning of porous or absorbent materials such as cloth, leather, wood or rope is prohibited.
- 7.1.8** Solvent agitation shall be achieved using pump recirculation, a mixer, or ultrasonics. Air agitation shall not be allowed.
- 7.1.9** Solvent spray shall only be a continuous fluid stream. An atomized or shower type shall not be used. In conveyORIZED cleaners, a shower type spray may be allowed provided that the spray is conducted in a totally confined space that is separated from the environment.
- 7.1.10** The solvent spray system shall not be used in a manner such that liquid solvent splashes outside the container.
- 7.1.11** For those cleaners equipped with water separators, no solvent shall be visually detectable in the water exiting the water separator.
- 7.1.12** Wipe cleaning materials containing solvent shall be kept in closed containers at all times, except during use.
- 7.1.13** A cleaner shall not be located where drafts are directed across the cleaner.
- 7.1.14** Drain cleaned material, within the freeboard area, so that the drained solvent is returned to the container.

**7.2 Batch-Loaded And ConveyORIZED Vapor Cleaners:** In addition to the requirements in Section 7.1 of this Rule, the operating requirements below shall apply:

- 7.2.1** The following sequence shall be used for start-up and shut-down:
  - 7.2.1.1** When starting the cleaner, the cooling system shall be turned on before, or simultaneously with, the sump heater.
  - 7.2.1.2** When shutting down the cleaner, the sump heater shall be turned off before, or simultaneously with, the cooling system.
- 7.2.2** The workload area shall not occupy more than half the evaporative surface area of the solvent cleaner.



**7.2.3** The spray must be kept below the top of the air-vapor interface.

**8 PROHIBITION:** After the date of adoption, a lip exhaust system shall not be added to any cleaner, unless it is vented to a control device, as described in Section 6 of this Rule.

**9 COMPLIANCE SCHEDULE:** Any person subject to any of the requirements of this determination, shall comply with the following increments of progress:

**9.1** By February 23, 1996 be in full compliance with the operating requirements of this determination

**9.2** By January 23, 1997 be in full compliance with the equipment requirements of this determination

## **10 TEST METHODS**

**10.1 Initial Boiling Point of Solvent:** The initial boiling point of the solvent shall be determined by ASTM D-1078-93.

**10.2 Capture Efficiency:** Capture efficiency shall be determined by the appropriate method described in the Code of Federal Regulations, 40 CFR 52.741, Appendix B.

**10.3 Control Efficiency:** EPA Method 25 shall be used to determine control efficiency, in combination with the appropriate method in the reference mentioned in Section 10.2 above.

**10.4 Volumetric Flowrate.** Volumetric flowrate shall be determined by EPA Methods 2, 2A, 2C and 2D.

**10.5 Exempt Compounds:** Determination of exempt compounds shall be performed in accordance with ASTM D-4457-85 (solvents and coatings) and be consistent with the provisions set forth in the Code of Federal Regulations (FR, vol. 56, No. 52, March 18, 1991).

**10.6 Volatile Organic Compounds:** For the purposes of this determination, the content of VOCs in solvents shall be determined by the appropriate procedures contained in EPA Method 24.

## **11 ADMINISTRATIVE REQUIREMENTS**

**11.1 Solvent Records:** The following records shall be retained for the previous 24 month period and be available at the time of a DISTRICT inspection:

**11.1.1** Each time waste solvent or waste solvent residue is removed from the facility for disposal

- 11.1.2** On a quarterly or shorter basis, record the facility-wide total volume of make-up solvent used for all cleaners.
- 11.1.3** Mix ratios of solvent compounds
- 11.1.4** VOC content of solvents
- 11.1.5** Maintenance records on solvent cleaning and/or degreasing operation